PROJECT DESCRIPTION
FOR
AQUATIC FILTER BARRIER DEMONSTRATION PROJECT
(GUNDERBOOM MARINE/AQUATIC LIFE EXCLUSION SYSTEM (MLES™))

SOUTHERN ENERGY DELTA, LLC
CONTRA COSTA POWER PLANT
CONTRA COSTA COUNTY
ANTIOCH, CALIFORNIA

Executive Summary

Southern Energy Delta, LLC proposes to install and test an aquatic filter barrier system (AFB) manufactured by Gunderboom, Inc at the Contra Costa Power Plant Unit 6 & 7. This is a new technology for fish screening. The AFB purpose is to lessen the plant's cooling water system impact on the fish species in the San Francisco-San Joaquin Delta by excluding them from entrainment and impingement as the full cooling water flow is drawn through a fabric barrier at low velocity. A physical and biological monitoring program is planned to evaluate the performance of the AFB. The AFB is an element of the plant's proposed Habitat Conservation Plan that supports the facility's application for an incidental take permit.

Introduction

The Southern Energy Delta, LLC (SED) Contra Costa Power Plant is located on the San Joaquin River east of the city of Antioch, California in the Sacramento-San Joaquin Delta (refer to attached plant location map). The plant was purchased from Pacific Gas and Electric Company in April 1999. The plant primarily uses water in a non-consumptive manner as cooling water in the electricity generation process. Some populations of special-status Delta fish species may be at risk of entrainment or impingement resulting from the cooling water intake process during normal plant operations.

The special-status fish species that may be at risk from ongoing plant operations include: delta smelt (federal and state threatened), Sacramento River winter-run ESU chinook salmon(federal and state endangered), Central Valley ESU steelhead (federal threatened), Sacramento splittail (federal threatened and state species of special concern), longfin smelt (federal species of concern), Central Valley spring-run ESU chinook salmon (federal and state threatened), Central Valley fall/late fall-run ESU chinook salmon (federal candidate species), and green sturgeon (federal species of concern and state species of special concern). Stripped Bass would also be addressed.

Currently, the plant reduces operations and preferentially operates units to minimize cooling water intake flows and discharge temperatures during periods when sensitive fish

species are in the vicinity of the plant. Although, lower water flows are designed to result in entrainment and impingement of fewer organisms, SED is endeavoring to implement and test a new state-of-the-art aquatic filter barrier curtain to further reduce or eliminate the potential for adverse impacts to sensitive aquatic species. SED is in the process of obtaining a federal incidental take permit by the preparation of a Habitat Conservation Plan(HCP) for the operation of the Pittsburg and Contra Costa Power Plants. The facility currently has a State MOU for species protection that is contingent on the final content of the HCP. The aquatic filter barrier is a proposed element of the HCP.

Proposed Project

SED proposes to install, on a test basis, an aquatic filter barrier curtain, the Gunderboom Marine/Aquatic Life Exclusion System (MLES™), at the Contra Costa Power Plant. This summary outlines the proposed test installation of a MLES™ at the plant to evaluate the effectiveness of this barrier technology in terms of exclusion of larvae and fish from entrainment into and through the plant's Cooling Water System (CWS). Impingment will also be evaluated. The safe exclusion of these organisms from the CWS would reduce or eliminate the potential for take of the species.

The system will screen the entire cooling water flow for Units 6 & 7 at the plant. Unit 6 & 7 use a maximum of 306,000 gallons per minute (gpm) for the CWS. The barrier curtain will be deployed in the San Joaquin river in a semicircle shape approximately centered on the existing Unit 6 & 7 shoreline intake (refer to attached Figure "Gunderboom Layout Plan"). The barrier curtain is estimated to be 1700' long and extend to 26' deep at MLLW at the deepest point (refer to attached Figure "Elevation/Section"). The center of the barrier curtain will be approximately 350' offshore. The barrier curtain will be secured in place by mooring to precast concrete anchor blocks set on the river bottom. A warning line of floats and buoys typical of other intakes in the Delta will be placed on the outside of the barrier curtain as a safety mechanism to alert boaters and others of the presence of the floating barrier. The barrier curtain will be cleaned periodically by an air burst system to remove fines and other particulates. A computerized system will control the air cleaning system and monitor physical elements and effects of the barrier curtain.

Technology History

The MLES™ has been in development at Lovett Generating Station on the Hudson River in New York since 1994. Protection of fish species at various life stages is the goal of the development. The challenge was devising a barrier system that could safely exclude very small organisms, while allowing the large volumes of water needed for the CWS to pass. The cooling water flow through the barrier was 42,000 gpm. The challenge was magnified by the fact that the Hudson River, like the San Joaquin River, is subject to relatively high total suspended solids (TSS) and these "silts" would clog up or "blind" most previous

methods of screening that had been attempted.

The development of the MLES™ resulted in a technology that can be placed around the intake of a generating facility and effectively keep the early life stages of various fish from becoming entrained in the CWS. This is accomplished by installing a barrier curtain material the full water depth, in a semicircle around the intake structure. When in place, the full water depth barrier curtain "filters" all water passing into the CWS.

The barrier curtain consists of non-woven matting of polypropylene and polyethylene fibers that are sewn together in two layers making vertical panels approximately 8' wide along the length of the curtain. The curtain is suspended in the water with a flotation billet system on the surface and secured to the river bottom with anchoring devices that both achieve the shape that is desired and hold the boom against the water current forces in the river. As the barrier curtain filters and excludes organisms, it also filters and collects suspended sediments or silts and excludes debris. The MLES™ includes an air burst technology that provides a sequential, small burst of air in the bottom of each panel on a schedule that is determined from the design field investigations. As the air moves upward through the water column in each panel, the bubbles expand and "shake" the curtain material and dislodge the silt and debris, allowing proper filtration to continue. The river and tidal current parallel to the barrier curtain sweeps away the dislodged material. This system is automated and adjustable to allow for a variety of conditions.

Implementation Phases

The implementation of the MLES™ is typically undertaken in phases that provide increasing levels of information and design detail – ultimately leading to the installation of the system.

The Contra Costa program has completed Phase I – Preliminary Data Investigation. Next Phase II – Field Investigation is conducted. The information collected from this work will be rolled into the Phase III and IV – Final Design and Fabrication. Installation of the Gunderboom, Inc. MLES™ system will follow thereafter. Operation of the AFB is scheduled to occur following receipt of permits.

MLES™ Design

The shape, length, depth and configuration of the barrier curtain is a function of many design-input issues. Information on these issues is gathered during Phase I - Preliminary Data Investigation and Phase II - Field Investigation. Gunderboom engineers and technicians look at:

- The flow rate of the CWS for the specific facility. In the case of Contra Costa, we are working with 306,000 gallons per minute (gpm) (680 CFS) and the goal is to achieve flow rates through the barrier curtain of 5-10 gpm per square foot of submerged fabric. Historical data indicates that these flow rates provide the optimum performance of the system and result in very low through curtain velocities, in the order of .01 to .02 feet per second (fps). These low flow rates keep the loads on the curtain low. In round numbers, this results in a curtain with 30,000 square feet of material submerged for the Contra Costa facility.

- The next step is to determine how to configure the boom around the intake structure to achieve this total submerged area. As can be seen in the attached drawings, the preliminary investigation of the site indicates that the curtain can be placed in a semicircle around the intake with a total length of approximately 1,700' in length and provide the total square footage desired.

- Gunderboom technicians then analyze the characteristics of the water in the river to determine how the curtain material will react with the specific silts common to the area. Once again, history has proven that tests must be conducted on site to get accurate information about flow and silt characteristics, cleaning cycle time and variations. This is accomplished by conducting flow tests on site with samples of several different versions of the curtain material. This includes perforation size and patterns that can achieve maximum flow while providing adequate strength characteristics and exclusion of the required size organisms. Approximately 3/32 inch (2.4mm) diameter holes will be the baseline for evaluation.

- Bathymetry and side scan sonar data for the entire site and velocity data at several points in the planned configuration in the river will be collected for design use.

- The final critical element of design is the river bottom conditions so a determination can be made as to the type of anchoring system to be utilized. Geotechnical data of the river bottom along the footprint is obtained. With a short term or test installation, the anchoring system is typically a large concrete block system.

MLES™ Fabrication and Installation

Gunderboom fabricates the barrier curtain in sections for ease of handling and shipment. The anchor lines, air cleaning system and controls are fabricated offsite. The concrete anchor blocks for this installation will be precast locally. Fabrication of the MLES™ requires approximately 4 calendar months.

It is estimated that approximately 56 working days will be required to install the MLES™ and to make it operational. The first step in installation will involve placement of approximately 86 anchors on the riverbed and placement of the air supply and automated control system on shore. The curtain will be laid out on the assembly area adjacent to the Unit 6 & 7 discharge canal on a protective pad. Anchor lines will be attached, flotation billets will be inserted in the vinyl hood, the panel air lines will be installed and the curtain sections will be joined. The fabric is then "reefed" to the flotation similar to a sail and the lines and hoses are secured to the flotation.

A vessel will then pull the reefed curtain into the water and position it with temporary moorings, divers then secure the permanent mooring lines to the anchor system. The barrier curtain ends are then brought up the embankment and secured. Personnel then attach the cleaning system to the flotation. The air distribution and control system will be connected along the boom and connected to the air supply and control system on shore. Final adjustments are made to the moorings to ensure proper positioning. When the currents and weather are favorable, the barrier curtain is systematically released and settles down to the bottom. The barrier then begins to take shape and seal itself to the contours of the bottom. Once the barrier curtain is sealed to the bottom, the mooring lines are checked for balanced tension and divers inspect the underwater portions of the system.

The system is placed in start-up mode. During the first 20 days of operation, the physical elements of the system including the anchor lines and the air burst system are monitored and adjusted. The cleaning system (air burst) sequence is coordinated with the parallel to screen current, siltation rates and other influences that may effect the barrier curtain's performance.

A system of warning markers and lighted buoys will be deployed on the outside of the curtain barrier to provide warning to boaters and other water recreationists of the presence of the floating barrier system.

Monitoring Program

It is anticipated that the MLES™ testing and evaluation monitoring will continue for approximately three years. The monitoring program will have a physical and a biological element. The results of the testing will be provided in report form for the review and consideration of concerned parties.

Physical system monitoring will include the performance of features such as differential water levels on the inside and outside of the barrier, anchor lines' tension and air cleaning system performance. Divers will perform inspections of the barrier curtain, mooring system and curtain to bottom seal.

Biological monitoring is planned during the periods of concern for the sensitive aquatic species. Monitoring is planned for outside the barrier, inside the barrier and at the CWS discharge. It is anticipated that a barge-mounted pump sampling system would be used on the outside of the barrier curtain.

SED will use methods (i.e. sound or slow moving nets pulled by boat) to relocate fish present on the interior side of the barrier curtain to the exterior side during the installation phase.

Project Contacts

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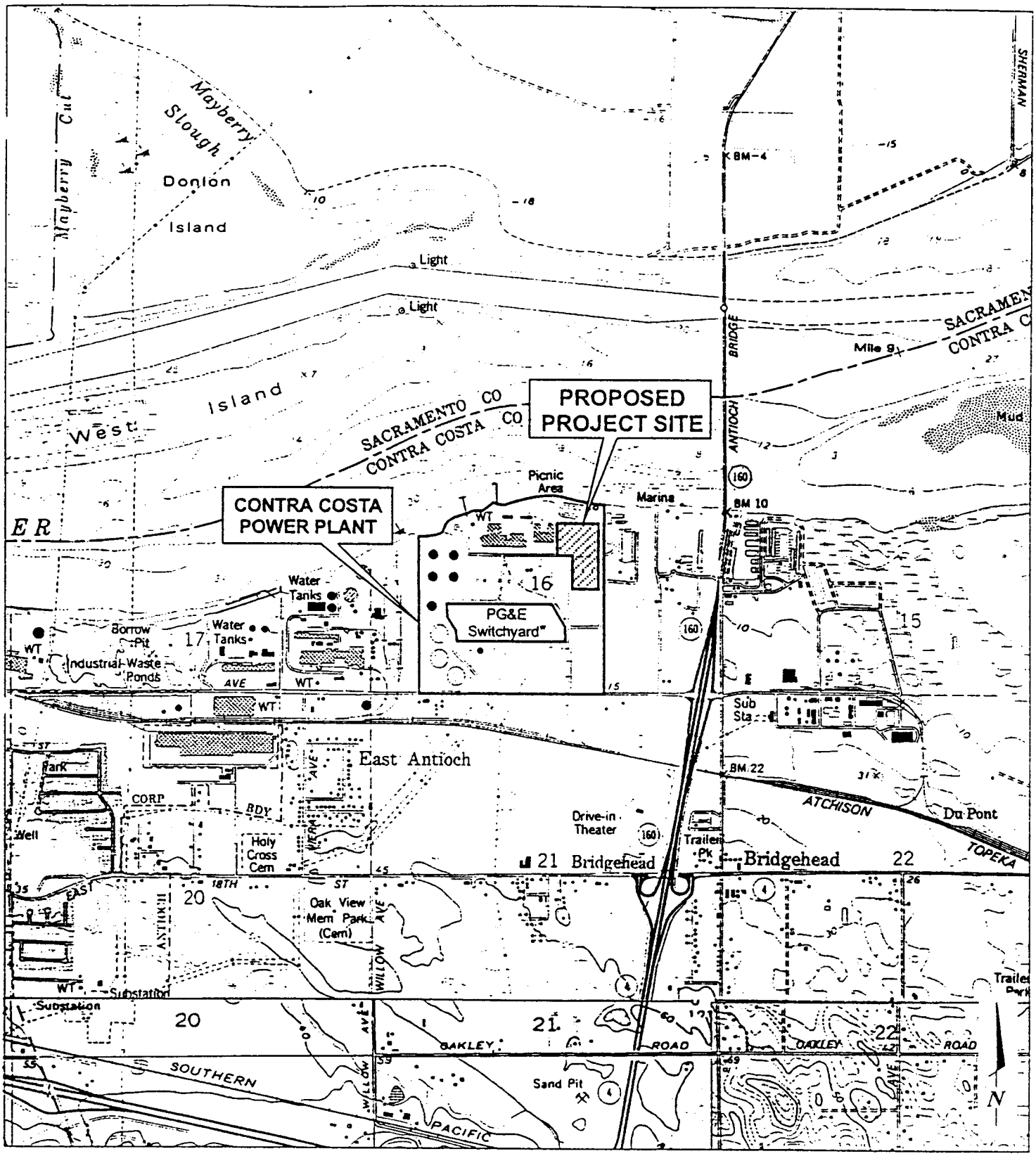

Source: USGS Topographic Map, 7.5 Minute Series
Antioch North, California, 1980
Antioch South, California, 1978
Jersey Island, California, 1978
Brentwood, California, 1978

* The PG&E Switchyard is not part of the site.

GENERAL REGION AND VICINITY OF THE CONTRA COSTA POWER PLANT

0 2000 4000

Scale in Feet
1:24,000

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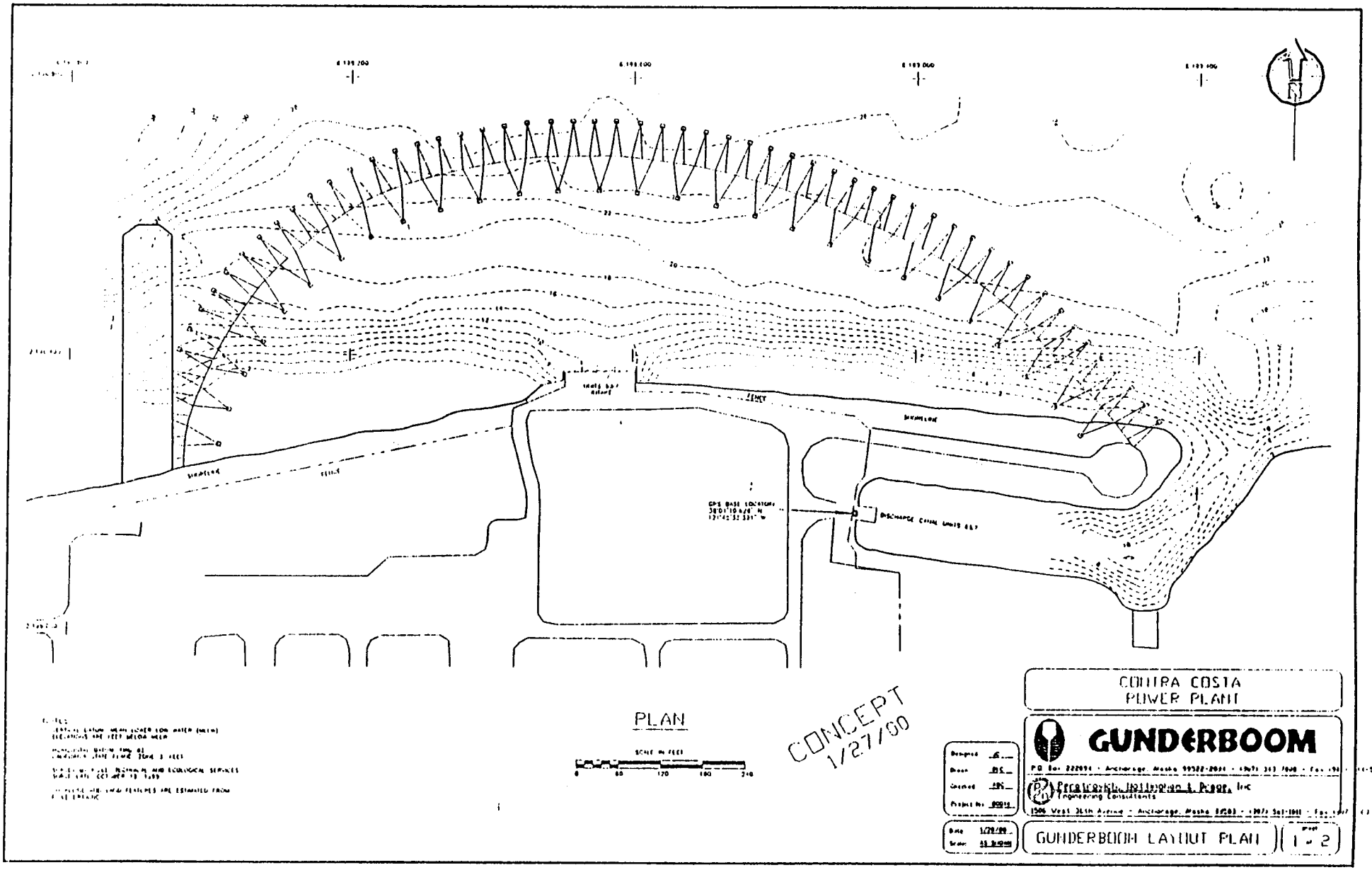
PLAN
SCALE IN FEET
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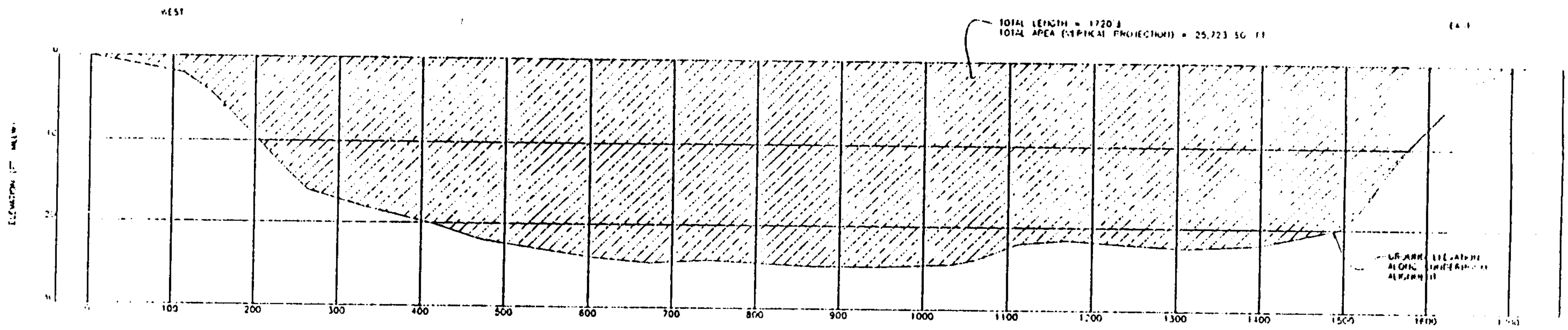
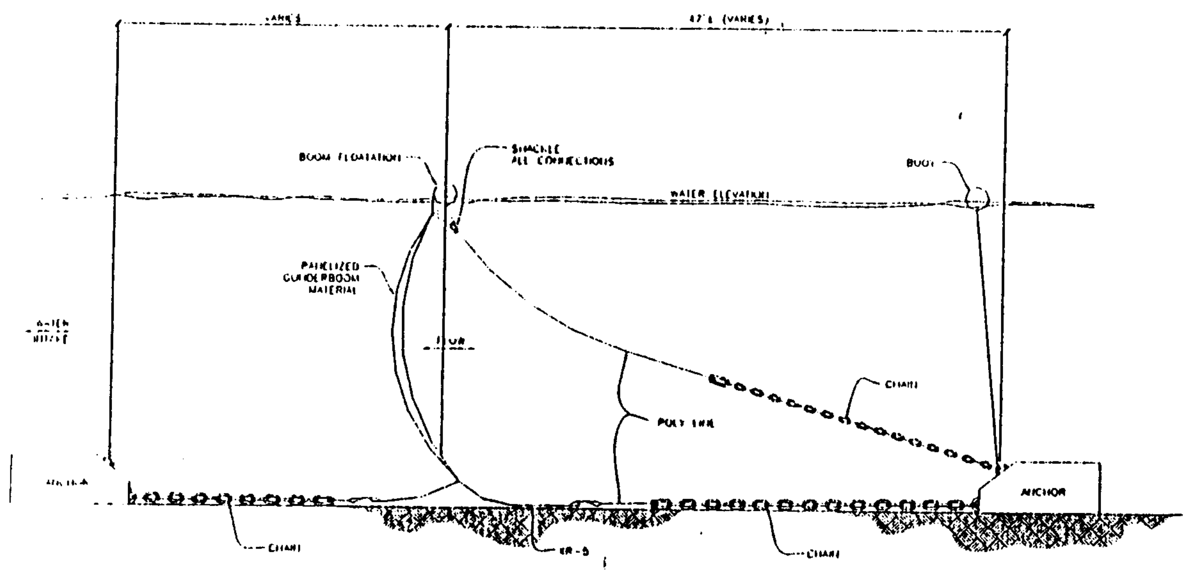
60
120
180
240
CONCEPT
1/27/00
CONTRA COSTA
POWER PLANT
GUNDERBOOM
GUNDERBOOM LAYOUT PLAN
1 - 2



ELEVATION
HORIZ. SCALE: 1" = 60'
VERT. SCALE: 1" = 8'



TYPICAL SECTION

CONTRA COSTA
POWER PLANT

GUNDERBOOM

ELEVATION/SECTION

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